The Maine Installer

Dedicated to Professionalism in Underground Tank Installation

Volume 8 Issue 1 April 2000

Combating CP-Test Heartburn; A Thoroughly Documented CP Test Is the Recommended Antacid for Coping with Symptoms Associated with the Common CP Inspection

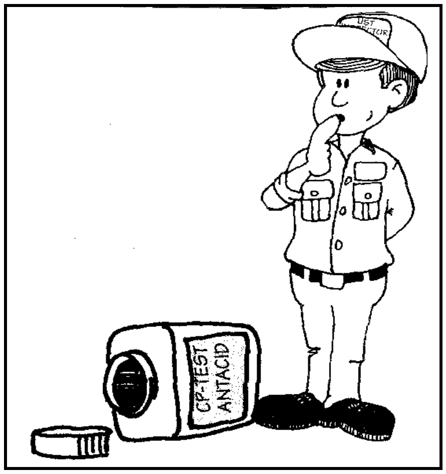
After 10 long years, the '98 deadline can finally be talked about in the past tense. As predicted, many storage system owners waited 'til the end was nigh and then wondered why finding people to do the work was like looking for water in the desert. Amidst all this chaos, of course, were the entrepreneurs who, upon seeing financial opportunity knocking, rummaged up workers and provided the "services" needed to meet tank owner demands.

***The result is that a lot** of shoddy tank work has been done in recent years, especially in those areas of the tank upgrade market that are attractive to tank owners on tight budgets -tank lining and cathodic protection (CP). Although the potential problems created by fly-by-night lining contractors may be buried and hidden from the inquisitive eyes of the typical UST inspector, there are some things that inspectors can see with regard to a cathodic protection retrofit -- things that can give an inspector pause, if not heartburn.*

Unfortunately, no matter how poor the workmanship, an inspector has little to say about the cathodic protection installation, as long as it has been blessed by a legitimate "corrosion expert" as defined in the rules and explained in EPA memos. (Refer to LUSTLine #23 for a description of qualified personnel.)

What Constitutes an Acceptable CP Test?

I do believe, however, that the regulatory inspector has some say when it comes time to evaluate the performance of a cathodic protection system by conducting the initial CP test or the triennial CP test. Here's how:



The federal rule (40 CFR 280.31 (b)(2)) contains no specific CP test criteria; it defers instead to industry standards such as NACE RP0285, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems." (The current edition of this document, RP0285-95, has a slightly different title, "Standard Recommended

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Inside This Issue

Spring Is in the Air; Inspections are on Our Minds

The Department is sending the annual reminder to owners of underground oil storage facilities, notifying them to have their leak detection and leak prevention equipment and their cathodic protection systems checked. Copies of this year's materials are provided as inserts to the newsletter.

Again this year the Department is sending out both the annual maintenance log sheet and the cathodic protection log sheet in a single mailing. This means that all tank owners, not just the owners of cathodically protected tanks or piping, will be receiving the cathodic protection log sheet. This may create some confusion as to which log sheets need to be filled out. Only the owners of cathodically protected systems need to have those systems checked annually.

The only changes this year are to the annual tank system inspection log sheet. The Dispenser section has been changed to include space for recording results from Dispenser sump probes – Pass, Fail or N/A (not applicable) for those dispensers without probes. No changes have been made to the Cathodic protection log sheet.

The Department is still recommending that completed copies of the log sheets be submitted to the Department. These log sheets will be placed in the facility registration file. It is important that installers notify facility owners of any missing or malfunctioning equipment. Facility owners must have repairs of leak detection equipment and other devices completed by a certified tank installer

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Combating CP Test Heartburn

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Practice-Corrosion Control of Underground Storage Tank Systems by Cathodic Protection.")

This NACE standard and others that I have reviewed describe specific testing criteria and methodologies for making measurements but provide precious little guidance about what constitutes an adequate CP test. There are no specifications concerning how many measurements should be made or how thoroughly a CP tester should investigate a system. These types of decisions are apparently left to the discretion of the tester, leaving the door wide open for some testers to be thorough and others to be quick.

Because the requirements for a CP test are not specifically spelled out in the federal regulations or industry standards, it seems appropriate for regulators to fill the void and set a minimum standard for what constitutes an acceptable CP test. The folks in EPA Region 4 did just that; they developed a standardized form to be used when documenting the results of a CP test of an UST system.

What data should be recorded during a CP test and why are these data important? A properly conducted and documented CP test will determine whether a CP system is adequately protecting its associated storage system. If the storage system is not protected, then all of the blessings of a CP expert are moot, and the system must be made to work.

A thorough, properly documented CP test should enable a knowledgeable reviewer to answer three questions about an UST system:

- Are sufficient data presented in the test report to evaluate the test results?
- Were a sufficient number of appropriate measurements conducted during the test to fully evaluate the storage system?
- Were appropriate CP test criteria used to arrive at a pass or fail test result?

Let's review each of these questions. But first, some caveats. To keep the following discussion from becoming an epic, I have limited the scope to the "typical" underground storage system at the "typical" convenience store or service station. I am assuming that the reader understands the mechanics of making CP measurements (See LUSTLine #25, "Testing Cathodic Protection Systems," for a refresher) and has some knowledge of CP principles. While I believe the discussion that follows is generally applicable to most storage systems, no doubt valid exceptions exist to the information and opinions presented.

There should be sufficient documentation so that any knowledgeable CP tester should be able to return to the facility and make the same measurements in the same places.

Are Sufficient Data Presented in the Test Report to Evaluate the Test Results?

All too many CP test reports merely indicate that on a certain day a certain facility was tested and that the storage system(s) "passed." In some cases, a number may be added (e.g., "-0.911 volt-pass"). In some cases, especially where the monitoring results are less favorable, a number (e.g., "-0.777"), without even a pass or fail conclusion, is the extent of the test documentation.

Such results are incapable of being evaluated, because there is nothing to evaluate. Simply not enough information is presented to determine whether the second and third questions listed earlier have been adequately answered.

My criterion for an adequately documented CP test is simple: There should be sufficient documentation so that any knowledgeable CP tester should be able to return to the facility and make the same measurements in the same places.

This criterion means that there should be fairly exact descriptions of where the reference cell was located, where connections were made to the cathodically protected structure, and what types of measurements (e.g., continuity, current-on, instant-off, polarization change) were conducted. There should also be a pass/ fail conclusion and a statement describing which CP criterion was used to reach

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Inspections on Our Minds

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or a certified manufacturer's representative within 30 days of discovery of a problem.

This spring the Department is conducting a study of the 1999 annual inspection results from approximately 290 sites. The results from this study will tell us how many tank owners are complying with the annual facility inspection requirement. It will also tell us what percentage of the inspections reveal systems that need repair or replacement and whether these systems are being repaired. Marcel Moreau is helping with this project and we hope to have the results by late summer. Your cooperation is appreciated as Marcel or his staff may call you with questions about some locations.

If you have any questions regarding the 2000 log sheets please call the Tanks Enforcement Unit at 207-287-2651.

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the pass/ fail conclusion for the test results.

Such detailed documentation is critical to a long-term understanding of what is happening to a CP system. If performance of a system is to be compared from one CP test to the next, all CP tests must be conducted in the same way. A remote "current-on" reading cannot be compared to a tank-top "current-off" reading. A reading where the reference cell comes in contact with soil cannot be compared to a reading where the reference cell is placed on concrete. Unless measurements are made in a nearly identical fashion each time a CP system is evaluated, comparison of CP test measurements conducted at different times is meaningless.

Were a Sufficient Number of Appropriate Measurements Conducted to Adequately Assess the CP System?

I have monitored many systems, both impressed current and galvanic, where portions of a tank met acceptable criteria for cathodic protection, but other portions of the same tank did not. Cathodic protection is not an all-or-nothing phenomenon. It is the rule, rather than the exception, that different portions of a storage system will have different levels of protection, depending on distance from the anodes, areas of localized coating damage, variations in moisture content of the backfill around the storage system, and a host of other variables.

Therefore, it seems unreasonable to accept a single measurement with a reference cell in a single location as evidence that a storage system is adequately protected. Yet many CP test reports contain a single number for a tank. In some cases, tests of galvanic CP systems are conducted by moving the reference cell around until a "passing" reading can be obtained -- regardless of whether the reading is local or remote, on concrete, or on the metal ring of a manway. Once this "passing" number is found, all other readings are discarded.

The UST rules require that all portions of a storage system that routinely contain product and that come in contact with the soil be adequately protected against corrosion. Thus a storage system must be thoroughly evaluated to ascertain that all portions of the tank and piping are protected – not just the end that happens to be close to a working anode.

In my opinion, voltage measurements for a standard-sized motor fuel tank should be made with the reference cell in at least three locations: one with the reference cell at one end of the tank, one on the other end, and one in the middle. The reference cell should be placed as close as possible to the top centerline of the tank. If the tank is completely covered by concrete or asphalt, then holes should be drilled into the concrete or test stations installed to provide access to the soil for placement of the reference cell.

Voltage measurements fall into two categories: current-on and current-off. Current-on measurements are conducted with the protective current applied (i.e., with the sacrificial anodes connected or the rectifier power turned on). Current-off measurements are conducted with the protective current turned off (i.e., with the sacrificial anodes disconnected or the rectifier power turned off).

Current-on measurements are the only option possible for virtually all galvanic systems installed on storage tanks, because the anodes are

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Board Bio: George Seel

George Seel recently joined the Board of Underground Storage Tank Installers as the representive of the Department of Environmental Protection. Mr. Seel works as the Director of the Division of Technical Services in the Bureau of Remediation and Waste Management, where he served for 14 years. He supervises the Bureau's engineers, geologists, and chemist. In total Mr. Seel has been an employee of the Department for over 20 years, having worked in a variety of programs including enforcement, radioactive waste, underground tanks regulation, and the remediation of the State's worst oil contaminated groundwater cases.

The focus of much of Mr. Seel's time over the last two years has been to educate the oil industry and the public as to the threat to groundwater and indoor air pollution from the ever-growing number of home heating oil tank failures. Along with other key Bureau staff, he designed and helped implement a two year pilot project to replace home heating oil tanks and piping posing a significant risk of causing an oil spill. Mr. Seel and his staff focused primarily on island communities and other highly sensitive areas with limited groundwater supplies to provide drinking water, including Monhegan Island, Long Island, Harpswell, North Haven Island, and Matinicus Isle.

Mr. Seel assisted in community affairs in his hometown of Belgrade. He served on a variety of town committees, including the planning board, of which he was the chair. He assists and is a former board member of the local land trust, the Belgrade Regional Conservation Alliance. When able he enjoys fishing, hunting, outdoor photography, and camping with his family in Baxter State Park.

Mr. Seel received a BS degree in wildlife management from the University of Maine, and an M.S. in natural resources utilization. Prior to working for Maine DEP, he worked for the Connecticut DEP and the U.S. Department of the Interior in the State of Washington .

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permanently attached. Both current-on and current-off measurements should be conducted for impressed current systems. The current-on measurements indicate the distribution of current on the structure and where the weak spots in terms of protection may be located.

The current-off (instant-off) measurements indicate whether the -0.85 volt current-off criterion has been met or what the starting point for the 100 millivolt polarization decay measurement is. If the -0.85 volt current-off criterion is not met, then voltage readings tracking the polarization decay should also be conducted and recorded, unless native potential readings are available to establish that the 100 millivolt polarization change criterion has been met.

Galvanic and impressed current systems should also include a continuity survey to establish that components, such as tank fittings, risers, and vents, are either isolated (galvanic systems) or continuous (impressed current systems). (See LUSTLine #25, "Testing Cathodic Protection Systems," for information on how to conduct a continuity measurement.)

Were Appropriate CP Test Criteria Used to Arrive at a Pass or Fail Test Result?

The appropriateness of CP criteria is one of the more prominent hot buttons among CP professionals. (For a great compilation of the CP criteria literature, see the 500-page NACE publication, "Cathodic Protection Criteria-A Literature Survey," published in 1989.) The 1995 edition of NACE Standard RP0285, "Standard Recommended Practice-Corrosion Control of Underground Storage Tank Systems by Cathodic Protection," contains three acceptable criteria for cathodic protection:

- –0.85 volt (850millivolts) current-on, defined as follows:

  A negative (cathodic) potential of at least 850 mV with the cathodic protection applied. The potential is measured with respect to a saturated copper/copper sulfate reference electrode contacting the electrolyte. Voltage drops other than those across the structure/electrolyte Boundary must be considered for valid interpretation of this voltage measurement.
- 0.85 volt (850mV) current-off, defined as follows:

  A negative polarized potential of at least 850 mV relative to a saturated copper/copper sulfate reference electrode
- 0.1 volt (100mV) of polarization change, defined as follows

  A minimum of 100 mV of cathodic polarization. The formation or decay of polarization can be used to satisfy this criterion.

What About the Criteria?

While the 0.85 volt current-on criterion is one of the most commonly used, it is also by far the most commonly abused. This criterion is most appropriate for use in structures where there is little current flowing through the soil (the meaning of the last sentence of the criterion), which, in most cases, means structures that are very well coated.

Application of this criterion to structures that are essentially bare (e.g., asphalt coated) whether the system has been equipped with galvanic or impressed current CP, in most cases will produce apparently "passing" results that are seriously in error. This criterion should be limited to well-coated, galvanically protected structures, such as STI P3 tanks. It is inappropriate for impressed current systems.

The -0.85 volt current-off criterion is simple and can be used on any cathodically protected structure, coated or uncoated , where it is possible to interrupt the protective current, either by temporarily disconnecting the anodes (galvanic systems) or temporarily turning off the rectifier

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CP-TESTING MEASUREMENTS	**Galvanic Well Coated**	**Galvanic Poorly Coated**	**Impressed Current**
Current-on readings with reference cell in at least three locations: both ends and middle of the tank. For piping, reference cell at both ends and every 10 feet along the piping run.	X	X	X
Current-off readings with reference cell in three locations: both ends and middle of the tank. For piping, reference cell at both ends and every 10 feet along the piping run.		X	X
Continuity testing for all metallic components connected to the tank or piping, including fill pipes, vent lines, automatic tank gauge risers, electrical conduit, etc.	X	X	X
Impressed current systems may also need to be evaluated for possible effects on adjacent structures, such as metallic natural gas lines or water lines. This step would involve checking for continuity and comparing current-on and current-off potentials on the adjacent structures.			X
Impressed current system test documentation to include the voltage and amperage output of the rectifier.			X
To pass, the 0.85 volt current-on criterion must be met at all reference cell locations along the length of the tank.	X		
To pass, the 0.85 volt current-off or 100 mV polarization change criterion must be met at all reference cell locations along the length of the **tank.**		X	X
CP tests should be sufficiently documented so that any knowledgeable person can make the same measurements in the same places. At a minimum, the CP test report should include a site sketch, the reference cell locations, structure connections, voltmeter readings, type of measurement (e.g., continuity, current-on, instant-off), the criterion used to evaluate the storage system, and the conclusions (i.e., protected or not protected against corrosion).	X	X	X

Operating Heavy Oil Tanks

The Department recently completed a mailing to owners of heavy oil tanks which contained the following information. In case you are called about the mailing, here is what DEP told them.

In the past few months there have been several reported cases of severe corrosion in underground tanks storing heavy oil. All of these cases have involved tanks that are less than 10 years old. The cause of the problem has not been determined, but there appears to be a correlation between tanks that store heated heavy oil and tanks with a steel interior. Currently corrosion problems have only been observed in a few tanks storing #6 heated oil but may occur in tanks that store #4 or #5 oil as well.

The Department is contacting all owners of underground oil storage tanks used to store #4, #5, and #6 heating oil to make them aware of potential problems.

Enclosed is information the Department has collected from tank manufacturers about proper operation of their tanks when storing heavy oil. Please read these requirements and recommendations closely. Failure to operate a tank in accordance with the manufacturer's requirements may damage the tank and void the tank's warranty. If you have specific questions regarding the operation of your tank, you should contact your tank manufacturer.

If you have any questions about this notice, please call the Department at (207) 287-2651 and ask to speak to someone in the Tanks Unit.

Cathodically Protected (CP) Steel Tanks

The Steel Tank Institute (STI) (847-438-8265) provides manufacturing specifications and licensing for several companies that produce CP tanks **(Mohawk Metal, Highland, Drummond, etc.).** The Department's recommendations for using these tanks for heavy oil are:

- STI-P3 tanks consist of the steel tank, exterior coating, anodes and isolation devices (either nylon bushings or gaskets). Each of these has temperature limitations. Contact your tank manufacturer, or the Steel Tank Institute, to verify the temperature limits for your tank.
- STI lists the maximum operating temperature for STI-P3 tanks with zinc anodes as 120 F. Where operation is above 120 F, magnesium anodes are required. Do not operate your

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(impressed current systems). If the potential (voltage) of the structure is -0.85 volt or greater (more negative) immediately after the protective current is interrupted, the criterion is met.

The –0.85 volt current-off criterion is rarely relevant to galvanic systems because, in most cases, the anodes cannot be disconnected. It can be applied to impressed current systems. In my experience, however, this criterion is rarely met on all portions of a storage system.

Like the –0.85 volt current-off criterion, the 100 millivolt polarization change criterion is suitable for any cathodically protected structure, coated or uncoated, as long as the protective current can be interrupted. The application of this criterion in the field is somewhat more involved. Just as for the -0.85 volt current-off criterion, the protective current is interrupted to obtain an instant-off or polarized potential, but the potential that is measured must then be compared with the potential of the structure prior to the application of any CP (the "native" or "freely corroding" potential). The polarized potential must be 100 mV different from the native potential.

If the native potential is known, this comparison is quick and simple. This statement assumes, though, that the native potential has not changed over time - an assumption that is more likely to be true if the moisture conditions around the storage system were similar at the time of the CP test measurement and at the time when the native potential measurement was made.

If the native potential is not known, then the polarization on the structure must be allowed to decay, a process that can take from minutes to as much as a day. This step can make this criterion expensive and inconvenient to implement.

Note that this criterion has nothing to do with -0.85 volt and that storage systems with instant-off readings well below -0.85 volt can still pass.

In a Nutshell

My suggestions for the types of measurements that should be conducted and documented when evaluating various types of CP systems are described in the chart on page 10.

So these are my thoughts ... What are yours?

Marcel Moreau. Reprinted from LUSTLine, Bulletin 32, June 1999

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tank above 120 F unless you know your tank has magnesium anodes.

- To reduce the potential for internal corrosion, the Department recommends maintaining as low an operating temperature as possible and using low sulfur fuel (≤0.5% sulfur).
- The temperature inside the tank should be measured by gauging both the product and the ullage space above the product. It is also important for tank owners to properly maintain steam coils (if used). Low product level or steam leaks from the coils can result in high ullage temperatures, which may damage the tank and void the warranty.
- The Department recommends checking the tank bottom monthly for water and removing any accumulation to prevent corrosion damage. When water is removed from a steel tank, it can be checked for bacterial growth to verify that the oil is free from contamination.

Jacketed Tanks and Composite Tanks

There are several licensing companies and manufacturers **(Plasteel, STI, Permatank, Tanx, Total Containment, etc.)** for this tank type, but the general requirements for storing heavy oil are similar. Composite tanks are double walled tanks with a thick film coating, typically fiberglass, adhered directly to the exterior of the outer steel tank.

- Consult your tank manufacturer before using a jacketed/ composite tank to store heated oil, in order to prevent damage to the tank's corrosion protection system (jacket, bushings, etc.) and voiding of the tank warranty. Maximum operating temperatures generally range from 120°F to 150°F.
- To reduce the potential for internal corrosion, the Department recommends maintaining a low operating temperature and using low sulfur fuel (≤0.5% sulfur).

Failure to operate your tank within the manufacturer's specifications can damage the tank and void the tank warranty.

Some manufacturers also recommend minimizing possible influxes of salt and/or water.

- The temperature inside the tank should be measured by gauging both the product and the ullage space above the product. It is also important for tank owners to properly maintain steam coils (if used). Low product level or steam leaks from the coils can result in high ullage temperatures, which may damage the tank and void the warranty.
- The Department recommends checking the tank bottom monthly for water and removing any accumulation to prevent corrosion damage. Bacterial growth is also a leading cause of internal corrosion. When water is removed from a steel tank, it can be checked for bacterial growth to verify that the oil is free from contamination.

Fiberglass Tanks

Fiberglass tanks can be single or

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Manufacturer contacts for questions about storing heavy oil:

Containment Solutions	Bob Upton	800-628-2657 x213
Drummond		800-361-5050 x305
Highland	Todd Shearer	717-664-0600
Mohawk Metal	John Millet	800-765-3110
Permatank	Steve Abrams	847-438-8265 x232
Plasteel	Rick Sharpe	760-729-1093
Steel Tank Institute (STI)	Lorri Grainawi	847-438-8265
Total Containment	Allan Copenhaver	877-668-6825
TANX	Bill Johnson	603-543-1272
Xerxes Corp.	John Burwell	612-887-1836

Convenience is Nice, But UST Systems Aren't Potato Chips

Life sure seems busy! During the week, we're busy filing into our local, super convenience store, fueling our car with gasoline and ourselves with designer coffee and gourmet danishes. On the weekend, we spend time driving our gritty, salt-sprayed, progeny-packed SUV back to the local convenience store to retrieve that showroom shine at the high-tech, brushless car wash. Then when we need our 3,000-mile oil and lube, we head right back to that very same convenience store. Yep, there's a lot going on at your typical, modern, co-branded convenience store. And just as we customers like our conveniences, so do tank owners and operators.

I'm thinking of one local convenience store just off I-95 and right down the road from a certain high-customer-traffic outlet town known for its rubber-bottom boots. The store has a high-throughput, highly pressurized fueling system that is just as high-tech as the coffee and the carwash. It's got double-walled tanks and piping, continuous interstitial-space monitoring, automatic tank gauges, line leak detectors—the works. The system is so well endowed, you'd think it could handle all its own affairs and make its own coffee to boot. But that's where we often fail our UST systems—we depend on them to do too much all by themselves.

Last March, the owner of this Maine facility got a major jolt that no high-test designer coffee could induce—raw gas came gurgling out of the adjacent storm drains! The troops, including the town fire brigade, a Maine Department of Environmental Protection (MDEP) responder, and the cleanup contractor with his ever-ready industrial-strength vacuum cleaner, were dispatched to the site. Over the course of two weeks, about 3,000 gallons of gasoline and water were recovered, but inventory records indicated that around 4,000 gallons were "missing"!

Thankfully, the station was located in an area served by town water, so groundwater contamination was not as much an issue as public safety. In this installment of "Tanks Down East," your trusty gumshoe will deal with the issue of siting and maintaining gasoline convenience and variety stores.

The Murky Details

So how the heck did 4,000 gallons slip through the multiple defenses of this very model of a modern storage system? Well, as with many such cases, it was the combination of cascading equipment failure combined with faulty follow-up.

This UST system consisted of double-walled fiberglass tanks and pressurized double-walled piping. In this type of piping system, the product is moved from the tank to the dispenser and nozzles by a submersible pump inside the tank. The product is sucked out of the tank by the pump to a manifold that sits on top of the tank, where it is then pushed up through the piping.

In this installation, the submersible pump manifold, which contains electrical connections to the motor and plumbing to the piping, is housed in the containment sump so that any leaks from the pump or piping can be contained and monitored. The sump itself is attached to the tank opening via a pressure plate and rubber gaskets.

This piping system is monitored for leaks in two ways. The first is a line leak detector—a device used to monitor for catastrophic piping leaks (i.e., three gallons per hour or more) and located, in most cases, in a port on the submersible pump manifold. The line leak detector will only detect three

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double wall construction. The double-walled models provide an interstitial space for leak detection monitoring. There are several manufacturers of fiberglass tanks **[Xerxes, Containment Solutions (formerly Fluid Containment, Owens Corning), etc].** The general requirements for fiberglass tanks storing heavy oil are also similar.

- Product should be stored at less than 150 F to avoid damaging the tank and voiding the warranty.
- If a heating coil is installed in a fiberglass tank it must be located at least 9" (Xerxes) to 12" (Containment Solutions) from the tank bottom to prevent damage to the tank.
- Department regulations require the owner or operator of a heavy oil tank (#4, #5 and #6 fuel) made of fiberglass or using fiberglass piping to record the product temperature inside the tank daily and keep a written log that includes the date, temperature and initials of person taking the reading.
- The temperature inside the tank should be measured by gauging both the product and the ullage space above the product. It is also important for tank owners to properly maintain steam coils (if used). Low product level or steam leaks from the coils can result in high ullage temperatures (>150 F), which may damage the tank and void the warranty.

Convenience

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gallon per hour leaks downstream of where it is installed.

Second, smaller leaks are detected by leak detection sensors, which are located near the bottom of the containment sump. Most of these probes are micro float switches, which, when immersed in liquid, make an electrical contact, sending an alarm to the control box.

The stage is set, so now let's see how this chain reaction got started and what kept it going.

On March 10, a contractor was called to investigate a customer complaint about a low-flow condition at the dispenser nozzles. Gasoline was found dribbling out of the pump manifold, and about one-half gallon had pooled in the bottom of the sump. The pump manifold was opened and fibers from an ingested sorbant pad were found to be restricting the flow. A failed gasket was replaced, and product was removed from the sump.

On March 11, the gasoline gurgled out of the storm drain and the troops arrived.

On March 12, the contractor was called back to the site to test the product line for the unleaded tank, which was found to be tight; however, when the containment sump was tested by filling it with water, all the water leaked out. Further investigation found that the gasket at the bottom of the sump was torn and had allowed product to leak out.

Later, a review of the electronic alarm history by the MDEP showed sump alarms on December 21, 1998, January 3, 1999, and March 3, 1999. The owner stated that the first two alarms were the result of water infiltrating through the sump covers during a storm event (rain). Each time the alarm sounded, the manager had removed about two inches of water from the sumps. The owner stated that the manager was not aware of the March alarm.

A review of the inventory showed a loss of around 4,000 gallons of gasoline from March 3 to March 11.

Vigilance Matters

What could have been done to prevent this problem? It boils down to maintenance and vigilance. The system, as a whole—pump, line leak detector, containment sump—missed the boat, and someone didn't respond to the sump probe alarm (or at least not appropriately).

This UST system was literally screaming for help, but unfortunately the operator probably thought that it was crying "water in the sump" wolf. The clues to this catastrophe were all there, but no one person heeded them all or knew what they all meant. Someone needed to step back and put the whole thing together.

In the design of the storage system, the owner could have elected to install fiberglass sumps, which are bonded directly to the tank and thereby eliminate the reliance on a gasket. Also, I believe that all containment sumps should be tested annually for leaks by filling with them with water to see if any leaks out.

As for false alarms caused by "nuisance" water coming through fitting penetrations and sump covers, the industry has been striving to develop a totally liquid-tight sump and, for the most part, has...well, they're gettin' there. However, we still have to contend with retrofitting those older first- and second-generation sumps that remain.

Station owners need to be more vigilant in inspecting and responding to problems. Another long-time station owner who now teaches UST management courses told me of a similar event at his station some years ago. As in the first story, he had a pressurized piping system with containment sumps, line leak detectors, and leak detection float switches.

As a cagey, veteran service station owner, he recognized the folly of relying solely on the technology, so once a month he would open up his containment sumps to take a look-see. During one of these monthly walkovers, he found, much to his horror, a sump a couple of inches shy of being full of gasoline!

In this case, the leak occurred near the top bolts of the actual line leak detector; since it couldn't check itself, it never "saw" the leak. The sump leak detection floats were physically stuck in place and could not float up with the product and signal a leak.

Facility Siting Matters

The sites mentioned above were in areas where water supplies were not threatened. In the case of the station mentioned in LUSTLine Bulletin 31, "A Little Drop'll Do Ya," and Bulletin #30, "The Holes in Our UST Systems," a modern convenience store was allowed to be located within 1,000 feet of a water supply well field.

For whatever reasons, the town carved an area out of its mapped wellhead protection zone so that the station could be built. Within less than a year of operation, MTBE was found in low ppb concentrations in the water district's monitoring wells and production wells (7,000 ppb concentrations were found in the tank excavation area).

The source of contamination was most likely several 10-gallon overfills, something that happens when fuel delivery truck drivers override the overfill prevention device. A driver may think he's filling a 10,000 gallon tank, but in reality, he is dealing with a 9,700 gallon tank. So, on occasion, he is stuck with a hose full of product. Because he has more in the truck compartment than the UST can hold, he empties the hose into the 3-gallon spill bucket and the rest spills over and seeps into the surrounding soil. Again, our fancy technologies will do little good if we don't fully understand how they work.

One year after responding to the MTBE problem at this site, perchloroethylene (perc) was detected in the monitoring wells

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Convenience

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and traced back to the store's septic tank and sink traps!

We don't know how or why "perc" was poured down the cleaning sink. The real lesson here is that this site is too sensitive for a convenience store or just about any other type of land use that could accidentally discharge a contaminant into the environment.

The real shame is that the water district will abandon this precious resource and pipe water at great expense to the area from a surface source.

Yes, Facility Siting Matters

Another case I know of involves a typical small mom and pop (except in this case, pop has a ponytail) variety store that sells gas. The store is located less than 1,000 feet from a major sand and gravel municipal water supply well.

For several years, the water district fought to prevent the construction of the store. Nevertheless, in the early 1980s it came to be, decked out with a suction piping system and bare steel tanks. In 1990, MeDEP staff inspected this site and found that piping under the pump island had been damaged, most likely as the result of a car running into the dispenser.

The investigation that followed found minor contamination around the fill pipe, but much more from leaky aboveground suction pumps. Again, the tanks and underground piping were not the problem. The problem was that the leaks could have been caught early through simple, routine inspection.

By the grace of Gaia, the water district had installed a monitoring well system as part of its wellhead protection plan. This system allowed MDEP instant access to groundwater data to help expedite its plan of attack.

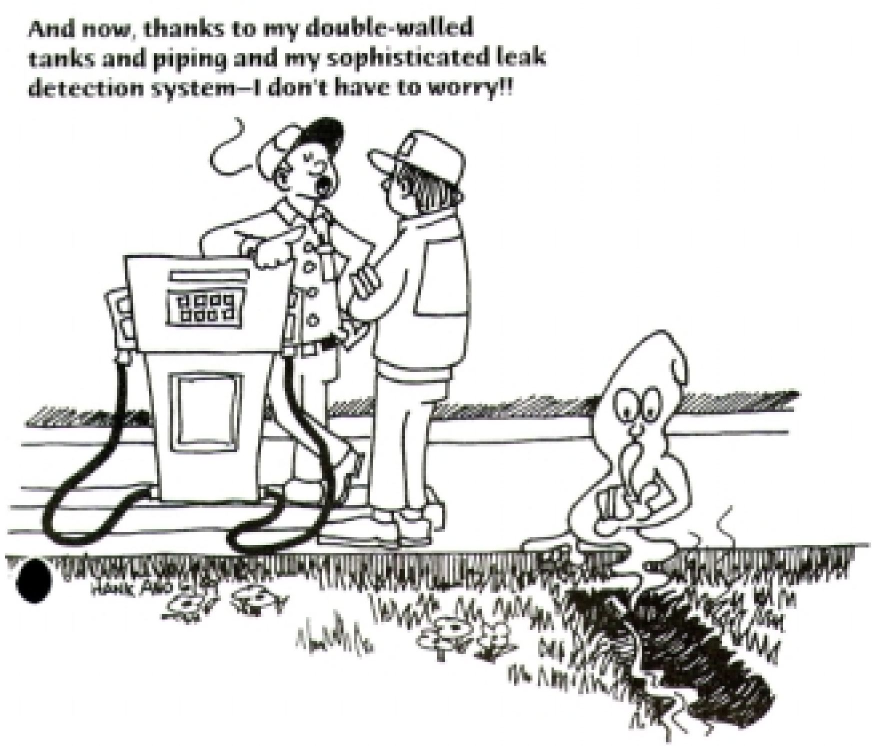
Thankfully, the story ended well, with only the very edge of the gasoline plume tickling the production well with low and ephemeral hits of MTBE—but at a cost of $600,000 to pay for a multiphase remediation system and two years of water piped in from the adjacent town.

The Sermon

It's clear that some of these stations should never have been allowed to be built so close to major water supplies. Unfortunately, many towns and cities suffer from the all-consuming lust for property taxes, and we, the consumers, suffer from the insatiable need for convenience. We're such slaves to technology that we forget how far a little horse sense can go. No matter how good the storage technology, it is still true that an ounce of siting prevention is worth many hundreds of thousands of dollars of remediation.

In many cases, tank owners and operators think they can simply buy the convenience of compliance. But technology ain't all it's cracked up to be, and it is up to owners and operators to keep a vigilant eye on things. Large industrial plants go to great lengths to physically check and double-check processes that involve dangerous chemicals. Station owners, operators, and employees need to treat their facilities in much the same way, because gasoline is not potato chips—it is a dangerous chemical that is both toxic and flammable.

David McCaskill, Engineer, Maine Department of Environmental Protection. Reprinted from LUSTLine, Bulletin 32.



Required Paperwork for Tank Reinstallation

Necessary paperwork for reinstallation of a tank includes the following:

- A **Notice of Intent to Remove an Underground Oil Storage Facility** (Removal Notice) filed at least 30 days before the tank is to be removed. If it is an emergency, contact the Response office that covers that town to see if you can get a waiver. Remember to send in the postcard to confirm the tank was removed. If the tank is reinstalled in the same hole normally no site assessment is required. If the tank is removed and reinstalled at a different location a site assessment must be done at the removal site for any tank that normally would require one. (Remember: Singlewalled tanks may not be reinstalled). If product has been found in the tank interstitial space and repairs are made to the outer wall of the tank the Department may require some investigation to confirm that no contamination has occurred. Consult with the Response person who has responded to your report of evidence of a leak.
- A **Registration Form for Underground Oil Storage Tanks** if the tank goes back into the same hole, a different hole at the same site or at a different site entirely. This means filing a full registration form for the installation at least 5 business days before the tank is reinstalled. Write TANK REINSTALLATION at the top of the registration form when you submit it. The owner must sign the form. If the removal is for emergency repairs and you will have difficulty meeting the 5-day notice requirement, contact John Dunlap at 207-287-3547.
- Once the tank has been reinstalled, complete and sign the **Certificate of Proper Installation** and return it to the Department. For tanks that are reinstalled in the same hole, be sure to note which portion of the piping you installed.
- In most cases you will also need to submit **documentation from the tank manufacturer confirming the tank is still under warranty**. Contact the tank manufacturer before you begin the removal to assure that none of the work you do will void the warranty, and to arrange for written confirmation that the warranty is still in effect on the re-installed tank. Repairs that jeopardize the manufacturer's original warranty are prohibited.

In short, the word on tank re-installations is DO YOUR PAPERWORK – Notice of Intent to Remove, Registration form, Certificate of Proper Installation and Tank Warranty. That paperwork can prevent major problems for you in the future.

The Maine Installer

ME Board of Underground Storage Tank Installers
c/o ME Department of Environmental Protection
17 State House Station
Augusta, ME 04333

Bulk Rate
U.S. Postage
PAID
Augusta, ME 04333
Permit No. 8